

Silent Small Supersonic Transport Vehicle Sector

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Silent small supersonic transport (S⁴T) Vehicle Concept



These images represent hypothetical designs for silent small supersonic transport vehicles.

For more information: <http://www.larc.nasa.gov>

Although NASA does not build aircraft, NASA uses conceptual designs such as these to study the effectiveness of technologies that may be incorporated by Industry into future aircraft. One particular technology category being studied at NASA is the silent, small, supersonic transports, or S⁴T.

Future forms of long distance air transportation will likely focus on improving the speed at which people and goods are moved from place to place. Depending on the market sector to be addressed, this revolution will embrace a wide variety of technologies. For the long-range transport of people and cargo, the focus will be on technologies that increase the speed at which aircraft fly.

Supersonic cruise speeds are the only way to reduce the flight time associated with long-range transoceanic routes. This speed increase will have to be accomplished with little or no adverse effect on efficiency or the environment. Revolutionary technology solutions are required to produce a new generation of supersonic cruise aircraft that are quiet and clean, both near the airport, and in cruise.

This new generation of supersonic aircraft will start out small, but will grow in size and capability as better technologies become available. The first of these aircraft will be built to move small numbers of people or lightweight, high value cargo. The principal requirement for this aircraft is a sonic boom low enough for acceptable overland supersonic

flight. The characteristics required to address this requirement are:

- Cruise speeds greater than Mach 1.2 over land, greater than Mach 1.6 over water
- A shaped sonic boom pressure signature with an initial pressure rise not greater than .5 lbs/sq.ft
- Transpacific range
- Payload > 8,000 lbs (up to 20 passengers and outfitting or cargo or a combination)
- Takeoff and Landing field lengths < 6500 ft
- Community noise level no greater than subsonic aircraft with the same weight
- Low emissions of NO_x, CO₂ and water vapor

The longer-term vision of this vehicle sector is a supersonic airliner. The key requirement for this aircraft is cruise efficiency. Environmental considerations are also a driver, as this aircraft will be expected to be equivalent to subsonic aircraft of similar size. Supersonic overland flight is a desired characteristic of this aircraft; however, achieving low boom at the expected cruise weights for an airliner would be difficult without some type of active sonic boom control. Given the expected state of such technologies during the next 25 years, the supersonic airliner may be restricted to reduced Mach cruise over certain land areas, and subsonic cruise over others. In this case, the desired characteristic would be equal efficiency to modern subsonic aircraft (fuel burned per mile traveled) at whatever cruise speed was required.